Fig.1

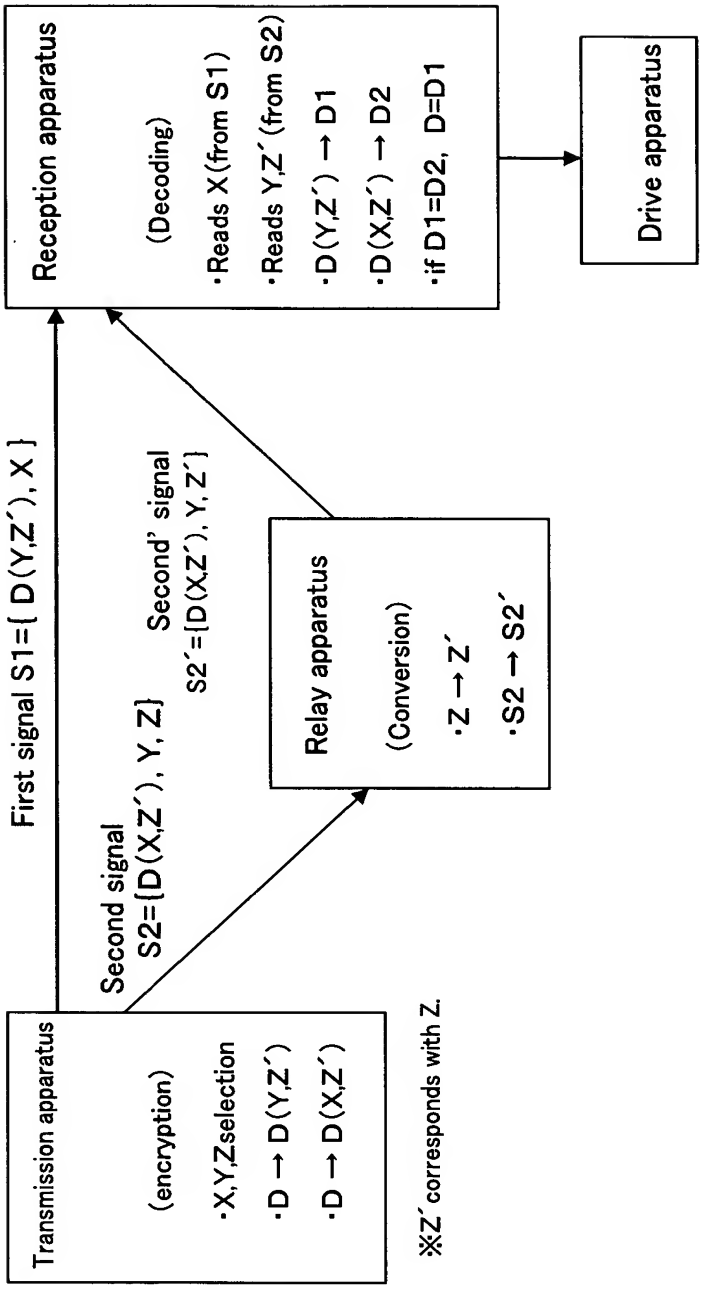
Reception apparatus
(Decoding)
・Reads X(from S1)
・Reads Y,Z´(from S2)
・D(Y,Z´) → D1
・D(X,Z´) → D2
・if D1=D2, D=D1
Drive apparatus
First signal S1={ D(Y,Z´), X }
Second signal
S2={D(X,Z´), Y, Z}
Second' signal
S2´={D(X,Z´), Y, Z´}
Relay apparatus
(Conversion)
・Z → Z´
・S2 → S2´
Transmission apparatus
(encryption)
・X,Y,Zselection
・D → D(Y,Z´)
・D → D(X,Z´)
※Z´ corresponds with Z.

Fig.2

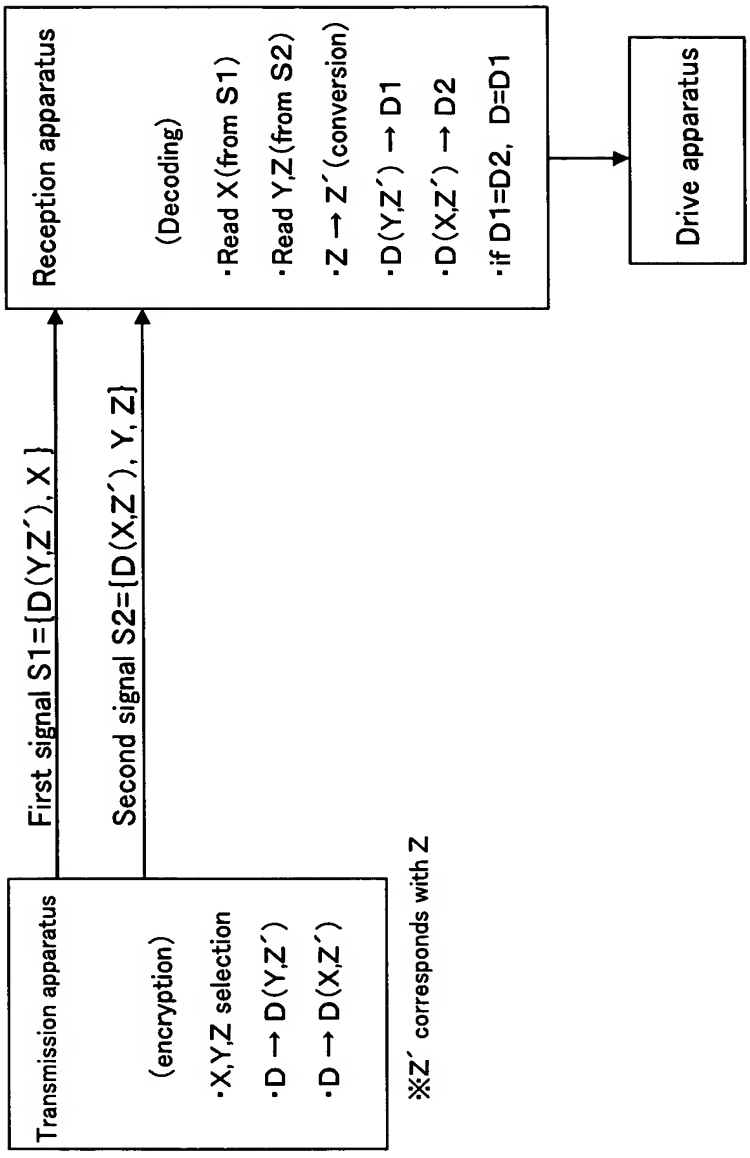
Transmission apparatus
(encryption)
・X,Y,Z selection
・D → D(Y,Z′)
・D → D(X,Z′)
※Z′ corresponds with Z
First signal S1={D(Y,Z′), X }
Second signal S2={D(X,Z′), Y, Z}
Reception apparatus
(Decoding)
・Read X(from S1)
・Read Y,Z(from S2)
・Z → Z′(conversion)
・D(Y,Z′) → D1
・D(X,Z′) → D2
・if D1=D2, D=D1
Drive apparatus

Fig.3

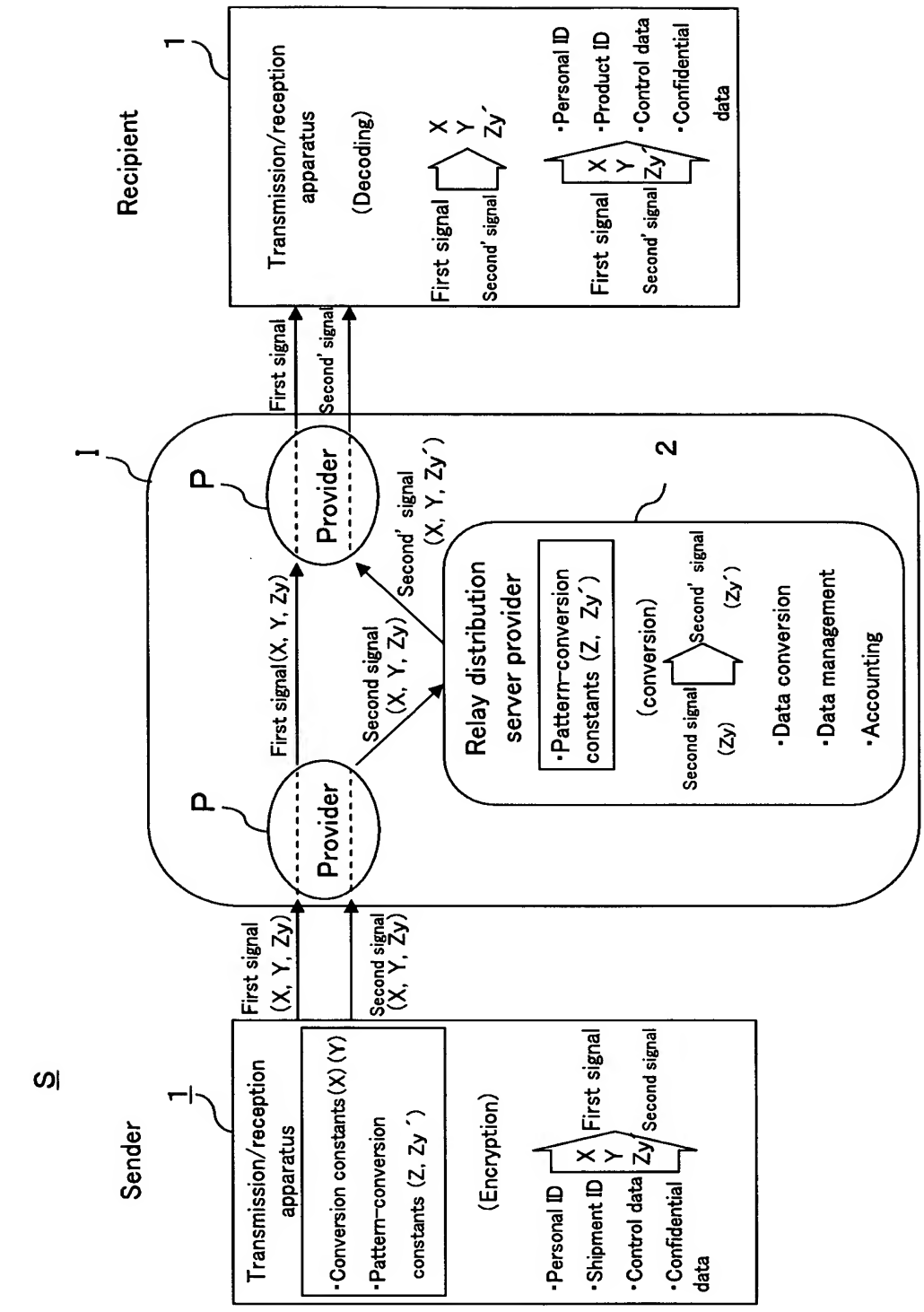
S
Sender
1
Transmission/reception apparatus
·Conversion constants (X) (Y)
·Pattern-conversion constants (Z, Zy´)
(Encryption)
·Personal ID
·Shipment ID
·Control data
·Confidential data
X
Y
Zy
First signal
Second signal
First signal (X, Y, Zy)
Second signal (X, Y, Zy)
1
P
Provider
P
Provider
First signal (X, Y, Zy)
Second signal (X, Y, Zy)
Second´ signal (X, Y, Zy´)
2
Relay distribution server provider
·Pattern-conversion constants (Z, Zy´)
(conversion)
Second signal (Zy)
Second´ signal (Zy´)
·Data conversion
·Data management
·Accounting
First signal
Second´ signal
Recipient
1
Transmission/reception apparatus
(Decoding)
First signal
Second´ signal
X
Y
Zy´
·Personal ID
·Product ID
·Control data
·Confidential data

Fig.4

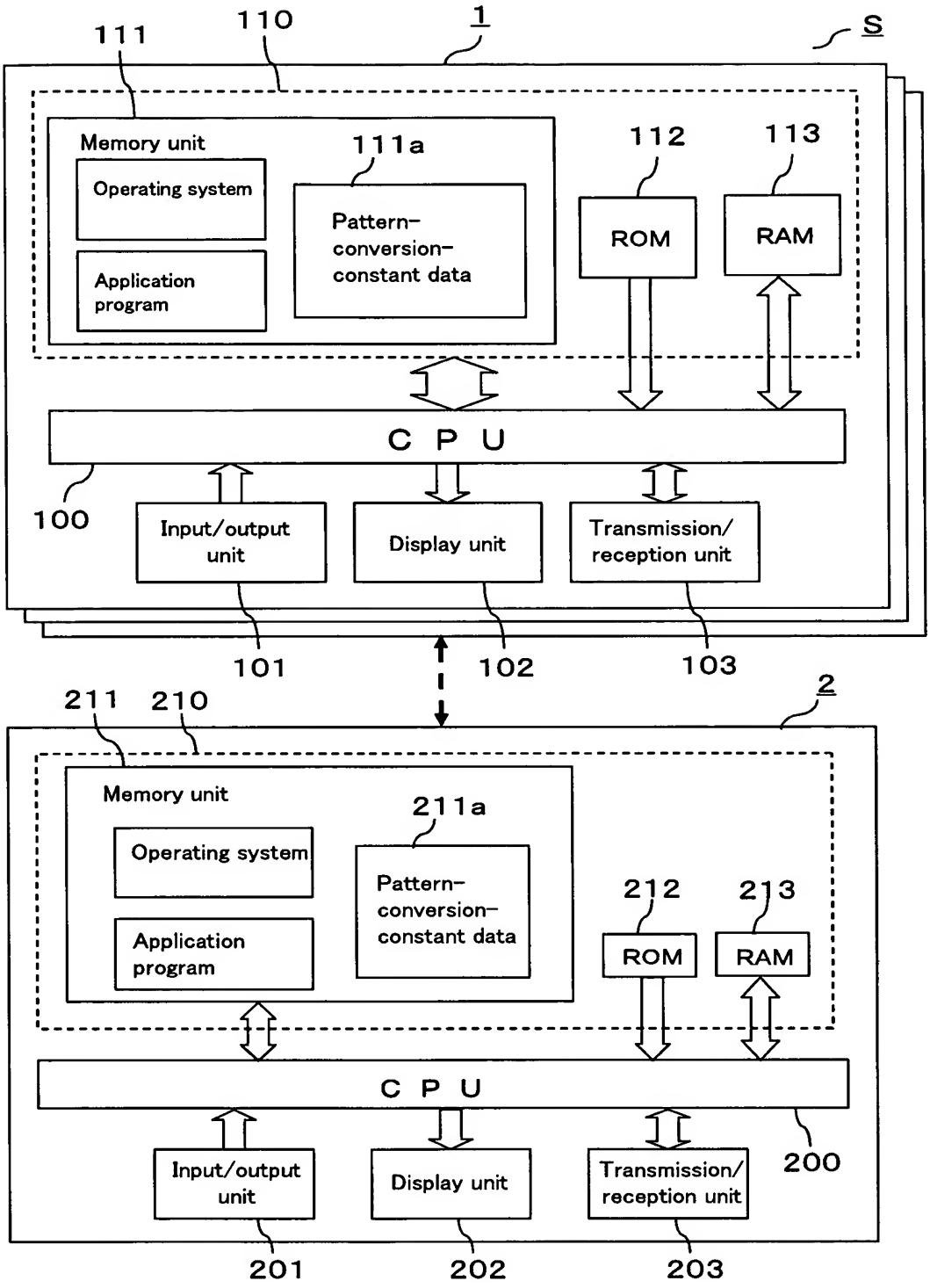
111
110
1
S
Memory unit
111a
Operating system
Application program
Pattern-conversion-constant data
112
113
ROM
RAM
C P U
100
Input/output unit
Display unit
Transmission/reception unit
101
102
103
211
210
2
Memory unit
211a
Operating system
Application program
Pattern-conversion-constant data
212
213
ROM
RAM
C P U
200
Input/output unit
Display unit
Transmission/reception unit
201
202
203

Fig.5

Signal encryption

A(personal authentication number):1234 5678 9012　B(shipment authentication number):0312 3456 7890　C(control data):20000

Encryption data	Decoding equations		Example of signal encryption data
A personal ID data	First equation	Ax=A+Y+Zy´	1234 5723 7977 = (1234 5678 9012)+(44 5566)+(3399)
	Second equation	Ay=A+X+Zy´	1234 5701 5755 = (1234 5678 9012)+(22 3344)+(3399)
B shipment ID data	First equation	Bx=B+Y+Zy´	0312 3501 6855 = (0312 3456 7890)+(44 5566)+(3399)
	Second equation	By=B+X+Zy´	0312 3479 4633 = (0312 3456 7890)+(22 3344)+(3399)
C control data	First equation	Cx=C+Y+Zy´	46 8965 = (2 0000) +(44 5566)+(3399)
	Second equation	Cy=C+X+Zy´	24 6743 = (2 0000) +(22 3344)+(3399)

X, Y, Zy´:Conversion constants

Fig.6

First signal(encrypted signal)

A(personal authentication number):1234 5678 9012 B(shipment authentication number):0312 3456 7890 C(control data):20000

Name	Operation number password	Communication number	Sender's address	Name	Conversion constant		Substitute personal ID value	Substitute shipment ID value	Substitute control data value	Control pattern	Confidential data
Packet Number (PK No)	0	1	2	3	4	5	6	7	8	9	10
Signal	(OP)	T No	Ads	Nm	X		Ax	Bx	Cx	Cp	Dt
Data input example	0312	020001	E-mail Address	xxxxxx	22 3344		1234 5723 7977	0312 3501 6855	46 8965	b	Data Holder
	Not sent						Ax = (A+Y+Zy´)	Bx = (B+Y+Zy´)	Cx = (C+Y+Zy´)		On Lock

Fig.7

Second signal(encrypted signal)

A(personal authentication number):1234 5678 9012 B(shipment authentication number):0312 3456 7890 C(control data):20000

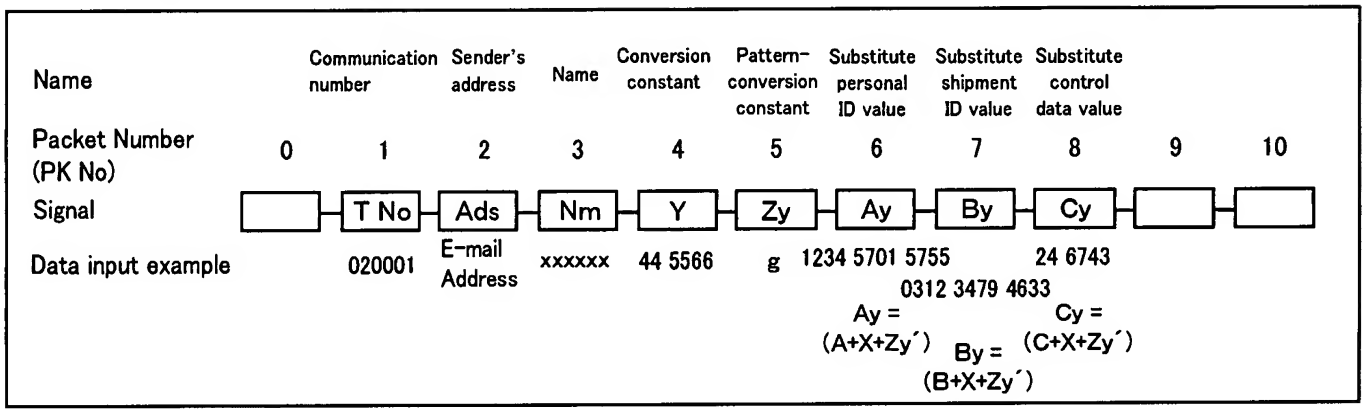

Fig.8

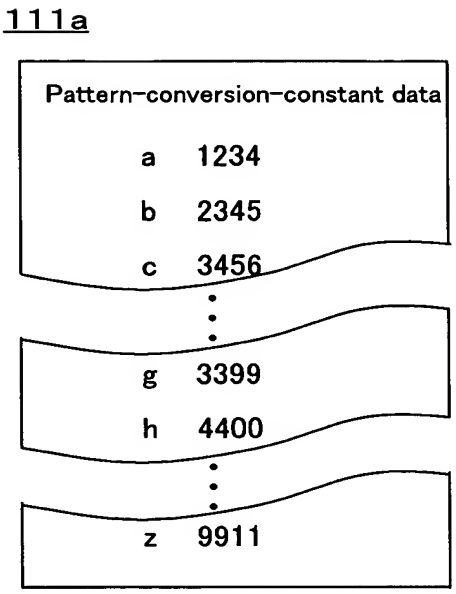
111a
Pattern-conversion-constant data
a 1234
b 2345
c 3456
g 3399
h 4400
z 9911

Fig.9

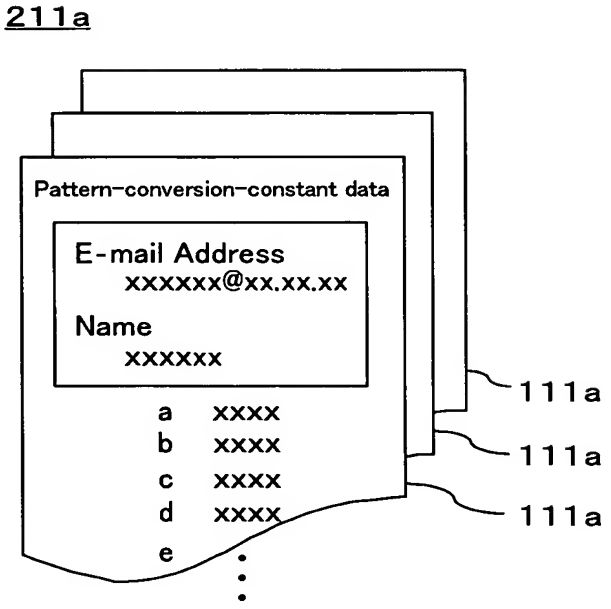
211a
Pattern-conversion-constant data
E-mail Address
xxxxxx@xx.xx.xx
Name
xxxxxx
a xxxx
b xxxx
c xxxx
d xxxx
e
111a
111a
111a

Fig.10

Second' signal(conversion signal)

A(personal authentication number):1234 5678 9012 B(shipment authentication number):0312 3456 7890 C(control data):20000

Name		Communication number	Sender's address	Name	Conversion constant	Pattern-conversion constant	Substitute personal ID value	Substitute shipment ID value	Substitute control data value		
Packet Number (PK No)	0	1	2	3	4	5	6	7	8	9	10
Signal		T No	Ads	Nm	Y	Zy	Ay	By	Cy		
Data input example		020001	E-mail Address	xxxxxx	44 5566	3399	1234 5701 5755 Ay = (A+X+Zy´)	0312 3479 4633 By = (B+X+Zy´)	24 6743 Cy = (C+X+Zy´)		

Fig.11

Signal decoding

Decoded data	Decoding equation		Authentication
A personal ID data	First equation	Nm / Ax−Y−Zy′=A1	A1=A2
	Second equation	Nm / Ay−X−Zy′=A2	
B shipment ID data	First equation	Bx−Y−Zy′=B1	B1=B2
	Second equation	By−X−Zy′=B2	
C control data	First equation	Cx−Y−Zy′=C1	C1=C2
	Second equation	Cy−X−Zy′=C2	

Fig.12

Example of signal decoded data

A (personal authentication number) : 1234 5678 9012 B (shipment authentication number) : 0312 3456 7890 C (control data) : 20000

A personal ID data	First equation	Nm (xxxxxx) / Ax (1234 5723 7977) − Y (44 5566) − Zy′ (3399) = A1 xxxxxx/1234 5678 9012
	Second equation	Nm (xxxxxx) / Ay (1234 5701 5755) − X (22 3344) − Zy′ (3399) = A2 xxxxxx/1234 5678 9012
B shipment ID data	First equation	Bx (0312 3501 6855) − Y (44 5566) − Zy′ (3399) = B1 0312 3456 7890
	Second equation	By (0312 3479 4633) − X (22 3344) − Zy′ (3399) = B2 0312 3456 7890
C control data	First equation	Cx (46 8965) − Y (44 5566) − Zy′ (3399) = C1 2 0000 (¥20,000)
	Second equation	Cy (24 6743) − X (22 3344) − Zy′ (3399) = C2 2 0000 (¥20,000)

Fig.13

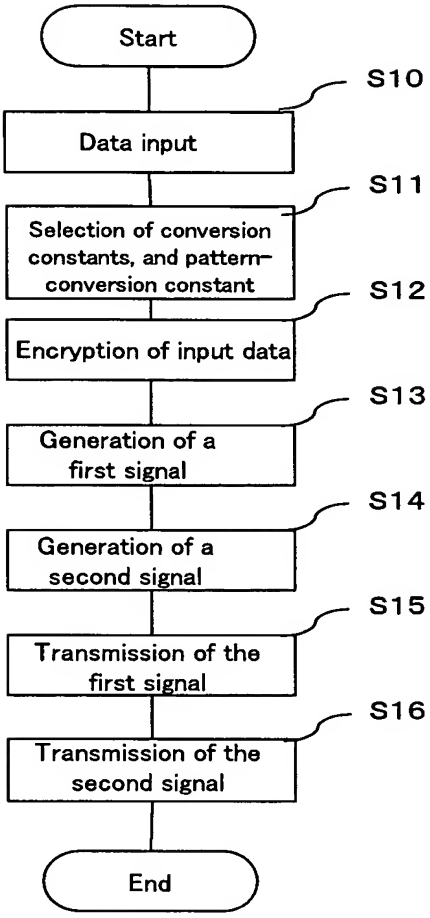
Start
S10
Data input
S11
Selection of conversion constants, and pattern-conversion constant
S12
Encryption of input data
S13
Generation of a first signal
S14
Generation of a second signal
S15
Transmission of the first signal
S16
Transmission of the second signal
End

Fig.14

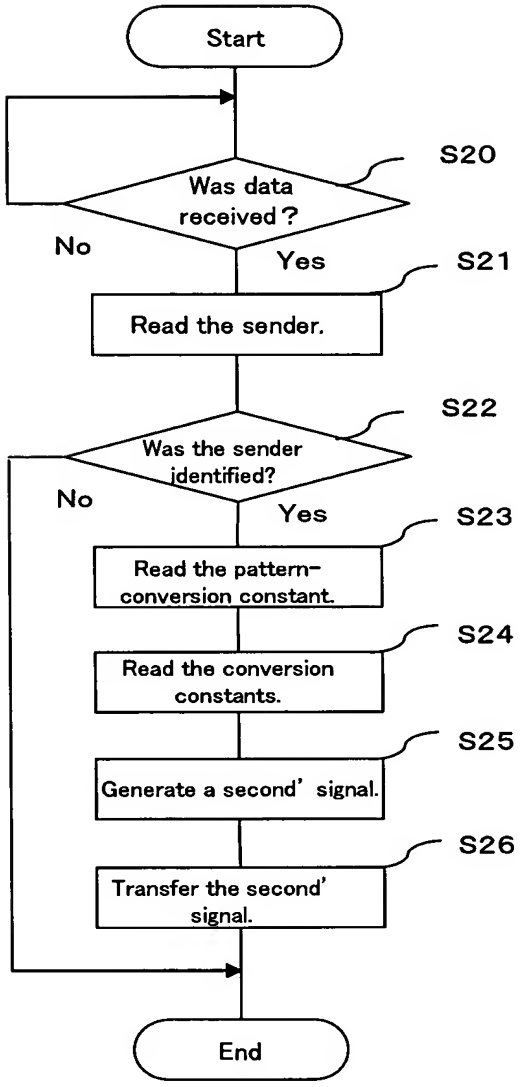
Start
S20
Was data received?
No
Yes
S21
Read the sender.
S22
Was the sender identified?
No
Yes
S23
Read the pattern-conversion constant.
S24
Read the conversion constants.
S25
Generate a second' signal.
S26
Transfer the second' signal.
End

Fig.15

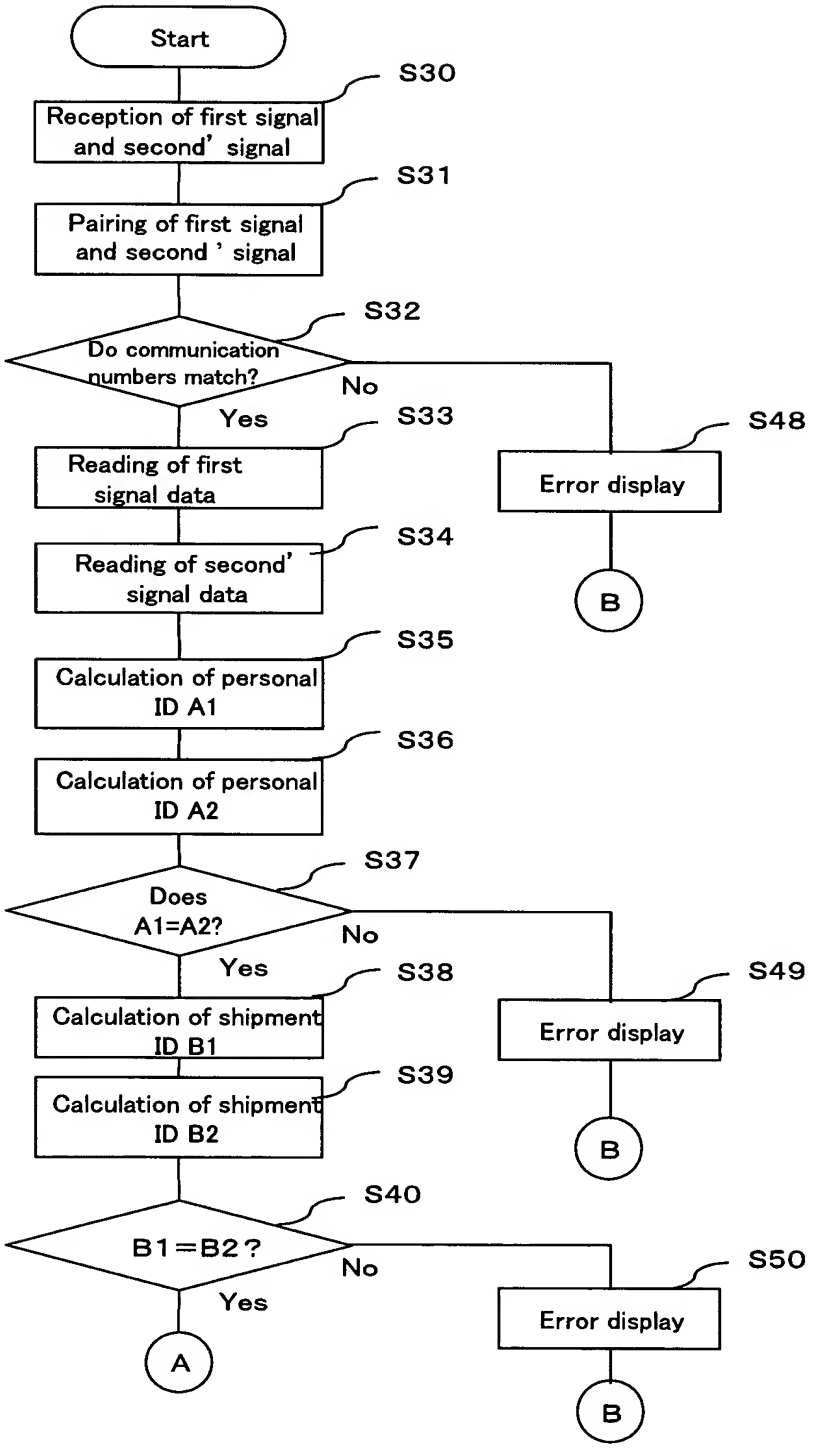
Start
S30
Reception of first signal and second' signal
S31
Pairing of first signal and second ' signal
S32
Do communication numbers match?
No
Yes
S33
Reading of first signal data
S34
Reading of second' signal data
S35
Calculation of personal ID A1
S36
Calculation of personal ID A2
S37
Does A1=A2?
No
Yes
S38
Calculation of shipment ID B1
S39
Calculation of shipment ID B2
S40
B1=B2?
No
Yes
A
S48
Error display
B
S49
Error display
B
S50
Error display
B

Fig.16

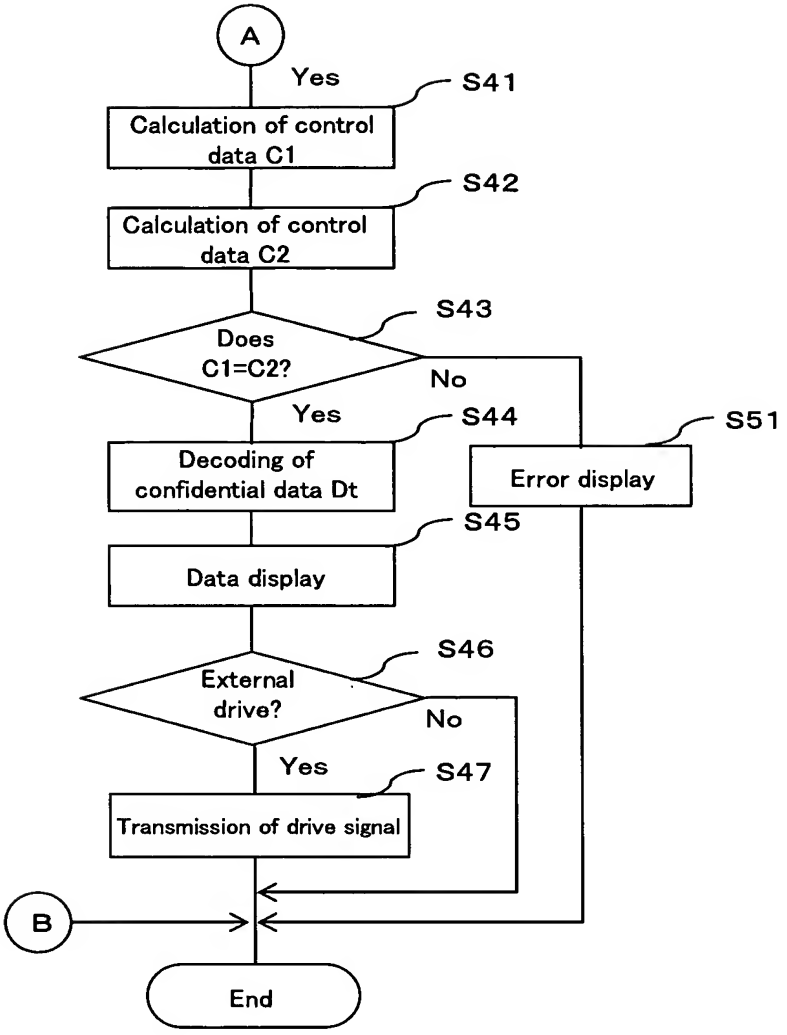
A
Yes
S41
Calculation of control data C1
S42
Calculation of control data C2
S43
Does C1=C2?
No
Yes
S44
Decoding of confidential data Dt
S51
Error display
S45
Data display
S46
External drive?
No
Yes
S47
Transmission of drive signal
B
End

Fig.17

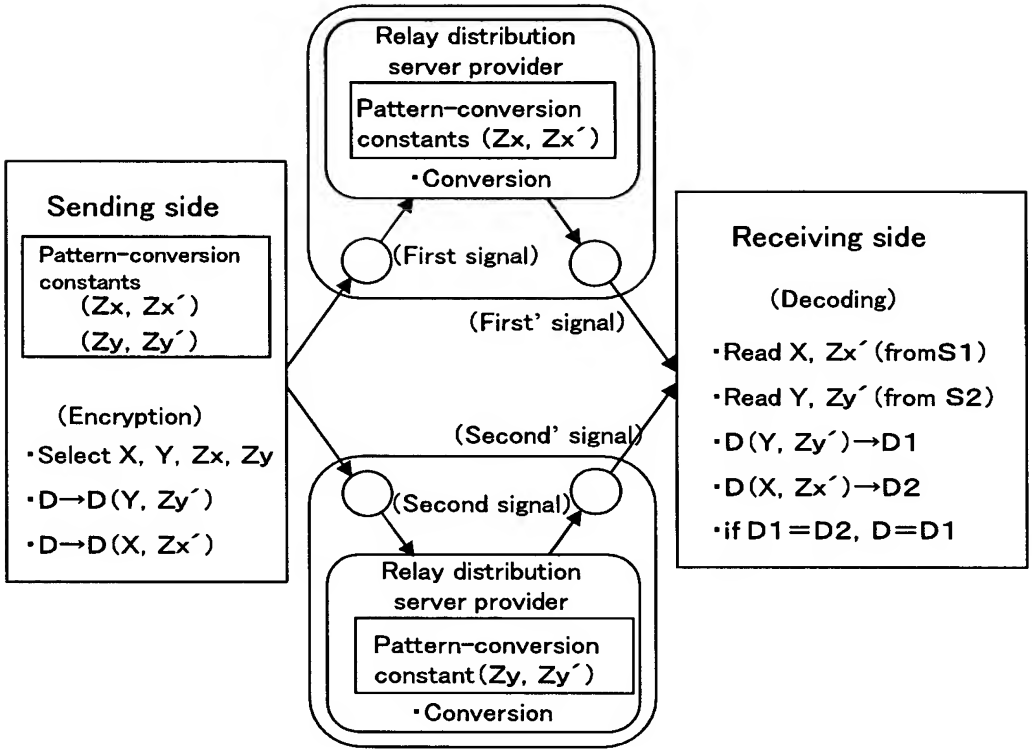
Relay distribution server provider
Pattern-conversion constants (Zx, Zx´)
・Conversion
Sending side
Pattern-conversion constants
(Zx, Zx´)
(Zy, Zy´)
(Encryption)
・Select X, Y, Zx, Zy
・D→D(Y, Zy´)
・D→D(X, Zx´)
(First signal)
(First' signal)
(Second' signal)
(Second signal)
Receiving side
(Decoding)
・Read X, Zx´(fromS1)
・Read Y, Zy´(from S2)
・D(Y, Zy´)→D1
・D(X, Zx´)→D2
・if D1＝D2, D＝D1
Relay distribution server provider
Pattern-conversion constant(Zy, Zy´)
・Conversion

Fig.18

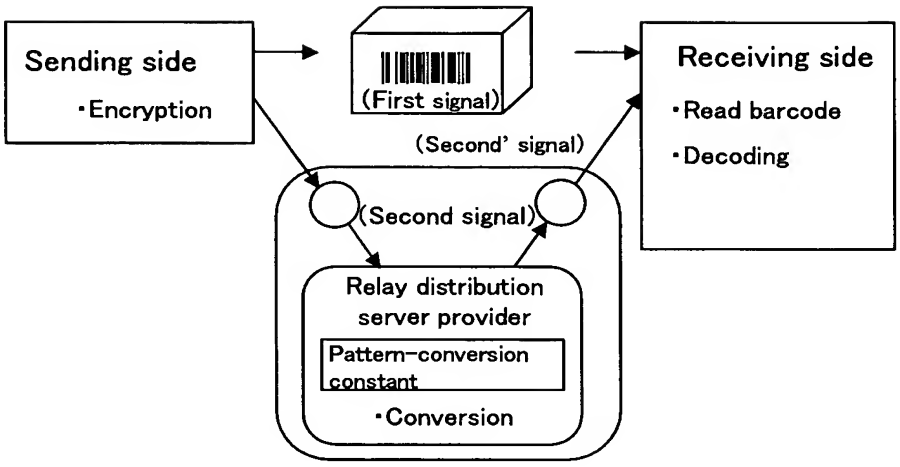
Sending side
・Encryption
(First signal)
Receiving side
・Read barcode
・Decoding
(Second' signal)
(Second signal)
Relay distribution server provider
Pattern-conversion constant
・Conversion

Fig.19

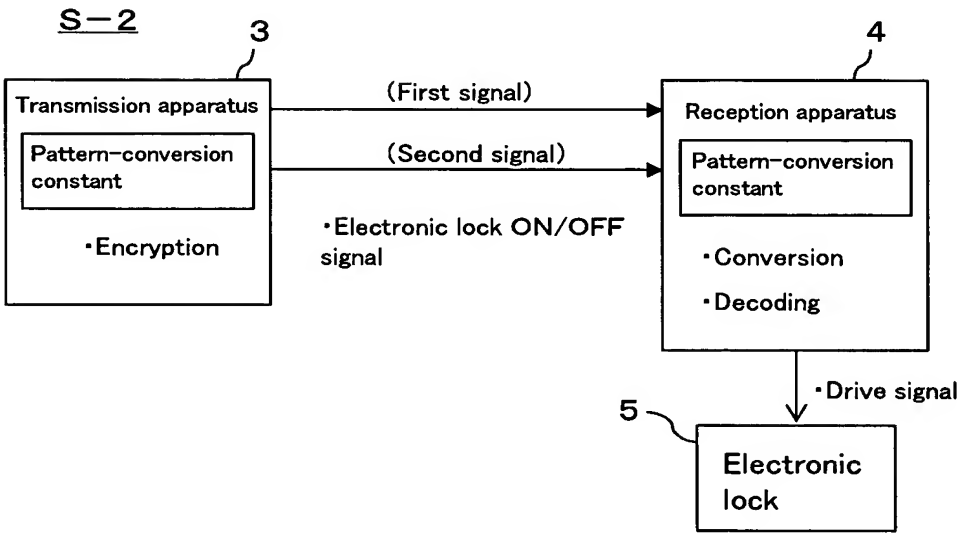
S－2
3
4
Transmission apparatus
Pattern-conversion constant
・Encryption
(First signal)
(Second signal)
・Electronic lock ON/OFF signal
Reception apparatus
Pattern-conversion constant
・Conversion
・Decoding
・Drive signal
5
Electronic lock

Fig.20

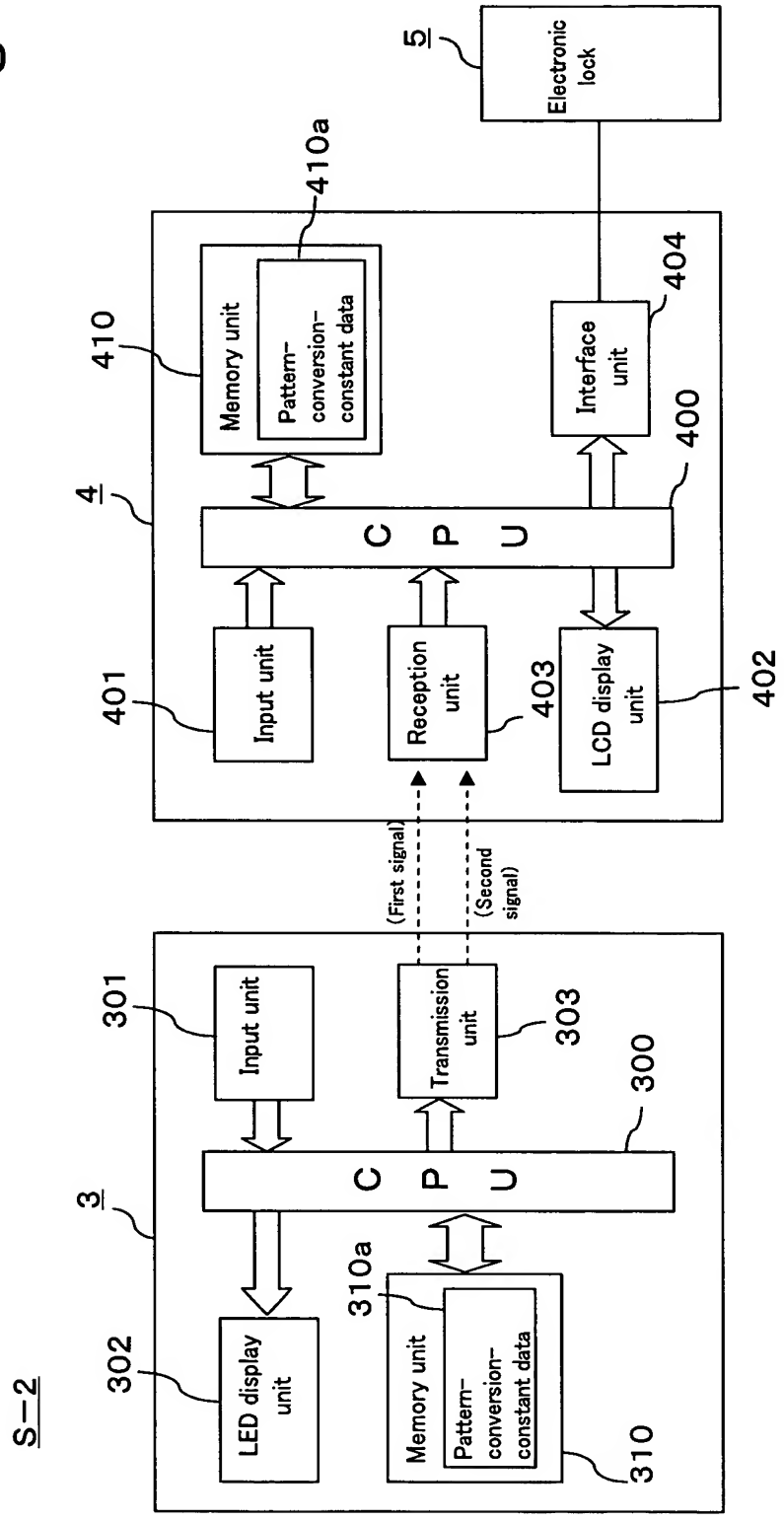
S-2
3
4
5
Electronic lock
410a
Memory unit
Pattern-conversion-constant data
410
Interface unit
404
400
C P U
401
Input unit
Reception unit
403
LCD display unit
402
(First signal)
(Second signal)
301
Input unit
Transmission unit
303
300
C P U
310a
Memory unit
Pattern-conversion-constant data
310
302
LED display unit

Fig.21

First signal(encrypted signal) A(personal authentication number) : 1234 5678 B(ON/OFF signal) : 1or 0

Name	Communication number	Conversion constant		Substitute personal ID	ON/OFF signal
Packet Number (PK No)	0	1	2	3	4
Signal	T No	X		Ax	B
Data input example	001	1122		1235 2421	1
				Ax = (A+Y+Zy´)	ON signal

Fig.22

Second signal(encrypted signal) A(personal authentication number) : 1234 5678 B(ON/OFF signal) : 1 or 0

Name	Communication number	Conversion constant	Pattern-conversion constant	Substitute personal ID	
Packet Number (PK No)	0	1	2	3	4
Signal	T No	Y	Zy	Ay	
Data input example	001	3344	g	1235 0199	
			g=3399	Ay = (A+X+Zy´)	